

AMENDMENT TO THE CLAIMS

1.(currently amended) ~~An apparatus for coupling to and retrofitting an existing process device, the apparatus providing a desired Safety Integrity Level (SIL) to the process device~~A process device for measuring a process variable of an industrial process, comprising:

a process variable sensor configured to sense the process variable;

device circuitry coupled to the process variable sensor configured to process an output from the process variable sensor and provide an output related to the sensed process variable;

a databus configured to carry data to components of the process device;

a safety response circuitry comprising:

a device interface to ~~couple~~ retrofit to the existing process device and provide an output related to operation of a component of the process device, wherein the device interface comprises a connection to ~~at~~the databus of the process device which is used to transfer digital data between the component of the device and a microprocessor of the device;

a component monitor to ~~retrofit to the existing process device~~ monitor data carried on the databus, and monitor operation of the component of the process device based upon the output from the device interface and responsively identify a safety event of the component indicative of a failure of the component and provide a safety event output; and

a safety response module to ~~retrofit to the existing process device and respond to~~ the safety event of the component based upon the safety event output in accordance with a safety response; and

wherein the device interface component monitor and safety response module are isolated from other components of the process device to provide redundancy.

Claims 2-3 (canceled).

4. (original) The apparatus of claim 1 wherein the device interface comprises a sensor coupled to the process device.

5. (previously presented) The apparatus of claim 4 wherein the process device couples to a process control loop and the sensor monitors current flow in the process control loop.

6. (original) The apparatus of claim 5 wherein the component monitor compares the sensed current with a current value.

7. (original) The apparatus of claim 1 wherein the safety response module controls the current in a process control loop based upon a safety failure.

8. (original) The apparatus of claim 1 wherein the device interface comprises a watch dog circuit.

9. (previously presented) The apparatus of claim 1 wherein the device interface senses power drawn by circuitry of the process device.

10. (original) The apparatus of claim 1 wherein the device interface couples to a memory.

11. (previously presented) The apparatus of claim 10 wherein the component monitor detects errors in the data stored in the memory.

12. (original) The apparatus of claim 1 wherein the safety response module provides an alarm output.

13. (original) The apparatus of claim 1 wherein the safety response module disconnects the process device from a process control loop.
14. (original) The apparatus of claim 1 wherein the safety response module disconnects circuitry in the process device.
15. (original) The apparatus of claim 1 wherein the safety response module attempts to compensate for the safety failure.
16. (original) The apparatus of claim 14 wherein the safety response module corrects for errors in data in the device.
17. (original) The apparatus of claim 16 wherein the safety response module interpolates between data points in order to correct a data error.
18. (original) The apparatus of claim 16 wherein the safety response module holds a previous data point.
19. (original) The apparatus of claim 4 wherein the sensor comprises a voltage sensor.
20. (original) The apparatus of claim 4 wherein the sensor comprises a current sensor.
21. (previously presented) The apparatus of claim 1 wherein the device interface monitors data carried in a databus of the device.

22. (original) The apparatus of claim 1 wherein the component monitor comprises software implemented in a microprocessor of the device.

23. (original) The apparatus of claim 1 wherein the safety event comprises a possibility of a future component failure.

24. (original) The apparatus of claim 1 wherein the safety event comprises a detection of a component failure.

25. (cancelled)

26. (currently amended) The transmitterapparatus of claim 251 wherein the safety response module is implemented in a feature module which couples to a sensor module of the process device.

27. (currently amended) The transmitterapparatus of claim 251 wherein the safety response module is implemented in a feature module which couples to a plurality of sensor modules.

28. (currently amended) The transmitterapparatus of claim 2526 wherein the component monitor monitors data from a sensor in the sensor module.

29. (original) The apparatus of claim 251 including a display and wherein the component monitors data sent to the display.

30. (cancelled)

31. (cancelled)

32. (previously presented) The apparatus of claim 1 wherein the component monitor monitors a plurality of process devices.

33. (original) The apparatus of claim 1 wherein the component monitor and safety response module are implemented in software.

34. (previously presented) The apparatus of claim 33 wherein the software upgrades an existing process device.

35 - 53. (cancelled)